Douglas B. MacDonald
Secretary of Transportation

Paula Hammond
Chief of Staff

John Conrad
Assistant Secretary

October 20, 2005 GMAP Report

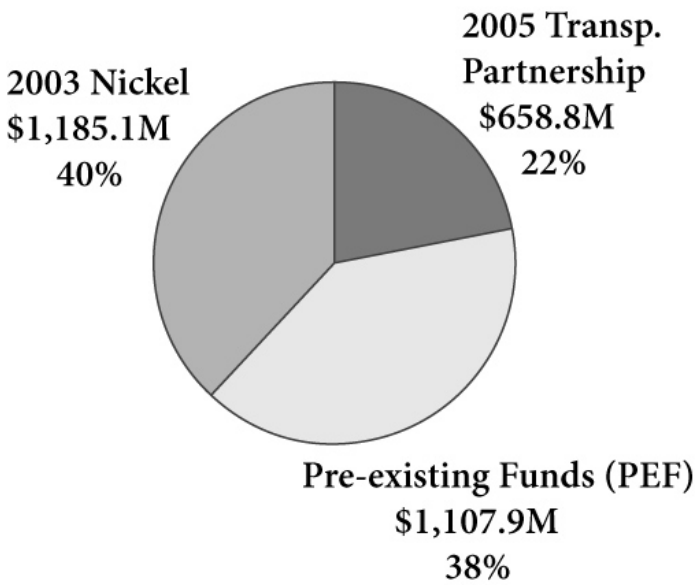
Highway Project Delivery

Today's Project Delivery GMAP Agenda

1. What are the sources of funding for the 2005-07 highway construction program?
2. How has the problem of project definitions been addressed?
3. What are the major steps in the basic project delivery process?
4. What are some of our performance measures for project delivery?
5. What is our delivery record for projects completed in 2003-05?
6. 360 highway construction projects were completed in 2003-2005. What were the main risk groups and causes contributing to the 93 projects that did not reach their on-budget targets?
7. What are our project delivery targets for 2005-07 and what will milestone reports look like?
8. What are the key challenges to basic project delivery?
9. What were the TPAB findings when evaluating environmental risks on ten construction projects?
10. How does WSDOT allocate its resources between external and internal project engineering workforces?

Overview: What are the sources of highway capital funding and what performance data is available?

A total of $2.9 billion is budgeted for highway capital projects for spending in 2005-2007



Analysis

•Project specific data is available for Nickel and TPA projects and program wide data is available for PEF projects.

•Legislative direction on project budgeting, management, and reporting evolved from programmatic (for PEF), to project specific (for 2003 Nickel), to a program and project mix (for Nickel and 2005 TPA Funding).

•Systems that enable real-time reporting are not available at WSDOT. Extracting information from existing legacy systems would involve a workforce commitment that is out of scale with current resources available for program management at WSDOT (and already committed to necessary program administration and fiscal reporting and controls).

Action Plan

•Critical Assessment Study of legacy/ IT systems is underway. Study results (December 2005) will be the basis for the IT system enhancements to supply and integrate comprehensive project management information.

•WSDOT has issued a Request for Qualifications (RFQ) and is in the process of selecting a national consultant team to assist with a new kind of program management service. The scope of work includes an assessment of current program and project management tools and recommendations for adoption of an off-the-shelf system to enable real-time reporting. Proposals are due October 2005, with the initial assessment to be completed by July 2006.

Data Notes: Budget table in back up slides.

Highway Project Delivery

Overview: How has the problem of project definition been addressed?

A proposal has been developed and must now be tested in the reporting and budget process.

Budgeted by Appropriation	**Improvement Program**					**Preservation Program**	
Budgeted by Leap List or Budget Note	Stand Alone Project	Project-Group	Corridor	Sub-Corridor	Mega/Major Project	Stand Alone Project	Project-Group
Definitions A "project" is defined as such (and counted) if it has a construction phase.	Single project correcting a deficiency at a specific location	Projects correcting one or more deficiencies at a specific or multiple locations (i.e. cable median barriers; fish passage; noise walls)	Series of projects with a common strategy to correct a deficiency	Subset of a corridor that is comprised of 2 to 4 projects with a common strategy to correct a deficiency	Capital improvement with multiple components over 1 or 2 biennia. Components do not result in useable/operational segment	Major preservation projects such as Hood Canal or Tacoma Narrows Bridge	Bridge Preserva-tion or Replace-ment and Pavement projects or programs

Analysis

- The working group (WSDOT, Legislative, GMAP, and OFM staff) identified the confounding array of capital projects varying in types, sizes, and scale.
- The term "Project" has had different definitions depending on when and for what purpose the term is being used.
- New definitions will be used for future performance reporting and possible budget restructuring.

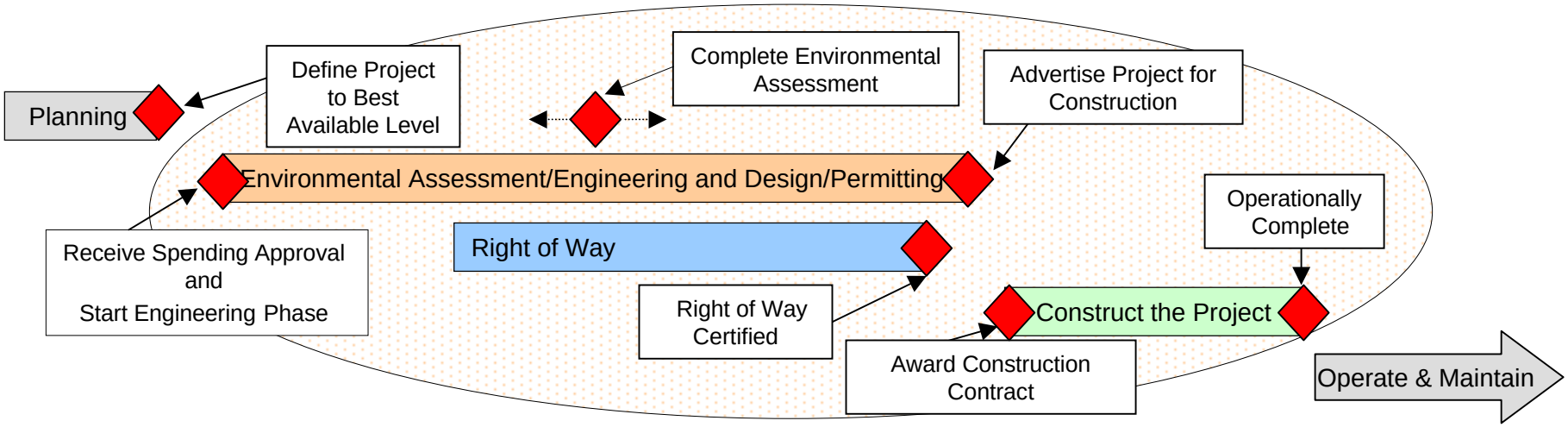
Action Plan

- Test proposals in forthcoming budget discussions and performance measurement reporting.
- As an interim step, WSDOT will use the 2005-07 legislative Commitment List of 359 projects to track and report against.*
- Align the 2007-09 budget and program**

Data Notes. * This list details those projects funded in the budget that have a construction phase. For projects with multiple construction phases, the list identifies the contract with the major elements of work for overall reporting purposes. ** Create a one-to-one relationship among Project, Budget, Program and Construction Contract for 2007-09. *Complete table available in back up slides*

Highway Project Delivery

Overview: What is the highway project delivery paradigm?



Analysis

- Individual project delivery steps and activities can range from a few hundred for a simple project to over 3,000 activities for a complex project.
- The above paradigm does not apply to Design-Build projects; Transportation Innovative Partnership projects; complex projects; major projects; and other exceptions.

Action Plan

- Implementing TPAB audit recommendations for project management, WSDOT deployed an executive order (July 05) to further enhance and ensure consistent project tracking across regions.
- WSDOT is currently evaluating the responses to the RFQ for project management support. The scope includes a recommendation for a project management data tracking system.

Highway Project Delivery

Overview: What are some of the measures of project delivery?

Engineering Phase

Existing measures include:

- Award amount to engineer's estimate
- Quarterly review of causes contributing to advertisement delays
- Time to complete NEPA and Environmental Impact Statements compared to planned or target schedule

Proposed Data Tracking/Reporting

- Quantify factors resulting in project advertisement delays

Right of Way Phase

Existing measures include:

- Number of projects for which Ad Date was delayed due to ROW issues

Proposed Data Tracking/Reporting:

- ROW certification levels at Ad
- Condemnation rates

Construction Phase

Existing measures include:

- Final cost to engineer's estimate and award amount
- Number of Nickel projects on-budget and time
- Number of injuries reported on Nickel project sites
- Environmental compliance

Proposed Data Tracking/Reporting:

- Contractor performance evaluations analysis
- Change Order cause analysis
- Cost growth drivers analysis

Analysis

- As of July 2003, WSDOT deployed a new tracking and reporting process for Nickel projects. Comprehensive delivery information has been published since 2003 in the *Gray Notebook's* Beige Pages.
- This was accompanied by intense regional management and oversight (i.e. Quarterly Project Review Meetings) that implemented WSDOT's "No Surprises" management approach.
- Overall, existing delivery measures are being reported as best as possible but the lack of an IT system is preventing the real-time compilation and analysis of performance data.

Action Plan

- WSDOT is currently evaluating the consultant submittals to gauge what type of delivery management systems are feasible in the short-term and what type of data can be provided.
- At the same time, the Critical System Assessment study should provide the basis for a major IT system overhaul proposal.
- Evaluate proposed new data tracking items for feasibility, technical needs, and reporting options.

Overview: What are the Existing and the Desired Project Management Tools?

Shortcomings of Existing Project Delivery Management Tools:

1980's Vintage "Capital Program Management System" developed to support legislative budget process.

- Antiquated programming language
- Poor project tracking and real-time management capability
- Complex data structure and transaction processing
- Errors difficult to detect and correct
- Clunky user interface that relies on codes instead of words

Accounting system "TRAINS" uses late 1980's technology

- No real-time data analysis compatibility for project managers
- Complex and difficult data structure relies heavily on obsolete codes

Project Management Tools "PDIS" selected as management system in late 1990's

- Limited or non-existent interface capability to other management systems including CPMS due to proprietary file structure
- Additional manual data entry required in all management systems to support decision making
- Poor project reporting capability
- Secretary's Order requiring Managing Program Delivery approach required on all projects issued July 2005

All systems require significant staff time to support data and fulfill reporting mandates introducing errors and inefficiency

Desired Project Delivery Management Tools:

Modern project and budget management systems supporting activity-specific schedule and budget planning

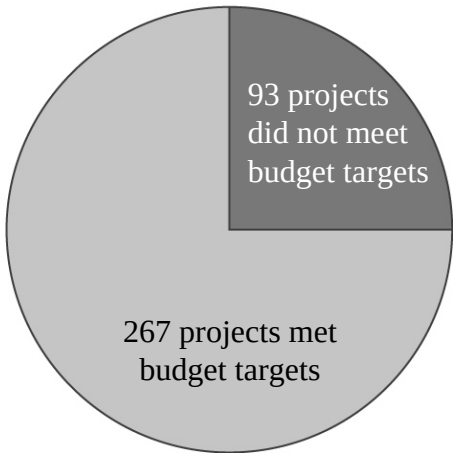
- Project management and budget management systems interface with accounting systems
- Project management systems provide real-time data and earned value tracking
- Management systems fully support data analysis and provide report writing and all levels of detail to support internal and external reporting
- Project and Contract administration systems provide real-time data and document control for project managers to quickly identify emerging issues and take appropriate action
- Systems have capability to interface with external parties, i.e. vendors, contractors, and consultants
- Comprehensive training is provided for managers and system users at all levels within the agency

Critical Assessment Study: Next Steps

WSDOT's IT strategy, including Critical Assessment Study results, will be presented at the Jan. 2006 Information Systems Board (ISB) meeting. This strategy will include a work plan with specific activities for the biennium in preparation for major system replacement projects planned for 2007-09 (provided legislative funding is authorized).

Budget: What is WSDOT's "on-budget" project delivery record for projects completed in 2003-2005?

Project Budget Performance 2003-2005



360 completed projects as of June 30, 2005

Analysis

- 360 construction projects were completed during the 2003-05 biennium. The overall cost was 1% over budget ($892 million as compared to the $884 million budget).
- An individual project is regarded as not meeting the budget target if it is more than 5% over the budgeted amount.
- Of the 360 individual construction projects completed: 173 projects (48%) were on budget; 94 projects (26%) were under budget; and 93 projects (26%) were over budget.

Action Plan

- Review projects that did not meet budget targets to determine why and what can be done in the future.

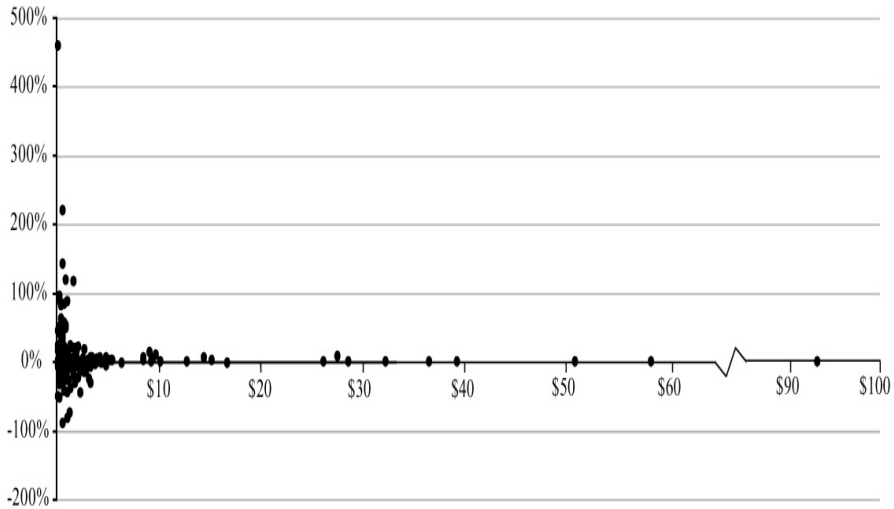
Data Notes : Based on the most recent legislative budget. Projects completed in the 03-05 biennium; covers the total project cost (all phases). On-budget is defined as within +/-5% of the last legislative budget in which that particular project is listed.

Risks: What were the main problems revealed in the 93 projects in 2003-05 that did not meet the budget target?

93 Projects Over Budget

Percent Over Target Compared to Original Budget

Dollars in Millions



- 80% of the projects over budget were low-cost projects – less than $1 million
- 15% of the projects over budget were between $1 million and $5 million.
- 5% of the projects over budget were greater than $5 million.

Data Notes: Full size graph in back up slides.

Analysis

- Factors are determined using a broad analysis based on input from project engineers, *Gray Notebook* exception reporting, project control forms and quarterly project review meetings
- A more in depth and regular "post mortem" type of analysis on all projects, while desired, is time consuming and adequate tools and resources are lacking.

Key contributing factors for 93 over budget projects:

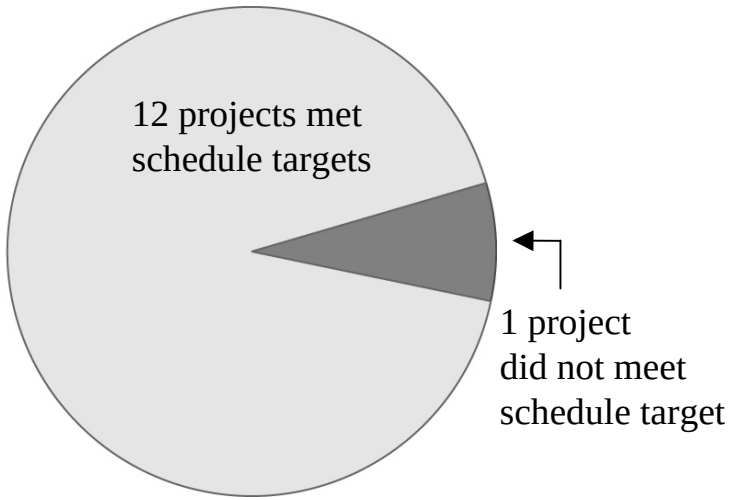
- 70% of the projects (65) had inaccurate material quantities or cost estimates in the scoping or design phase.
- 11% of the projects (10) experienced changed or unforeseen site conditions.
- 19% of the overruns (18) were due to weather, environmental, utilities, emergency, or other factors.

Action Plan

- Analyze change orders to identify items driving significant cost changes.
- Emphasize risk management practices to balance the level of engineering effort, detail and cost with the risks to project delivery due to estimation or design errors.

Schedule: What is WSDOT's "on-time" project delivery record for Nickel projects completed in 2003-2005?

Project Schedule Performance
2003-2005
"Operationally Complete"



13 completed projects as of June 30, 2005

Analysis:

- 13 Nickel construction projects were completed during the 2003-2005 biennium for a total of $40.4 million (9% under budget).
- In 2003-05 a project was regarded as not meeting the operationally complete schedule target if the project completion date was beyond the planned calendar quarter (defined in the 03-05 budget).
- 8 projects (62%) were completed early, 4 were on time (30%) and 1 was late. The project that was late was a variable message sign that experienced manufacturer software glitches.

Action Plan

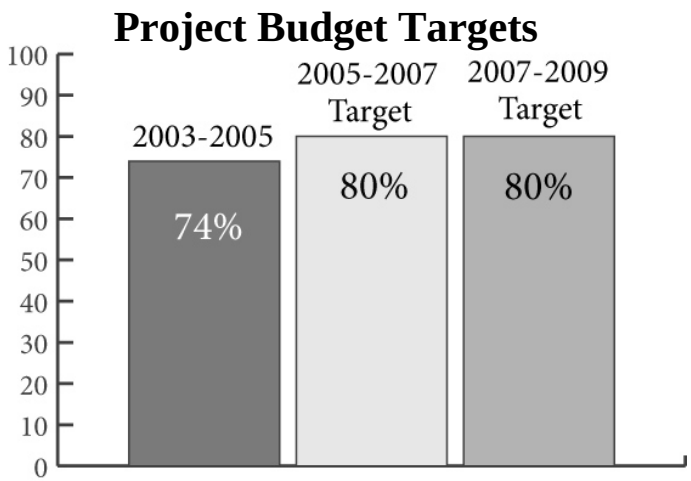
- Continue to review projects that did not meet schedule; targets to determine what and can be done in the future.

Data Notes: "On-time" is based on the *"operationally complete"* milestone for Nickel funds. Some Nickel projects have both Nickel and PEF funding. The PEF baseline data for mixed fund Nickel projects is currently being researched and will be included in the next *Gray Notebook* report, available on November 28, 2005.

Budget/Schedule: What are WSDOT's delivery targets for projects to be completed in 2005-2007?

Program Target: Complete the project program within the total program budget.

Project Target: 80% of tracked projects (e.g. Nickel) will meet budget* and schedule** targets.



Data Notes *Based on the last legislative budget, project budgets are subject to legislative adjustments. ** Based on "*operationally complete*" milestone.

Analysis:

- Targets are set based on demonstrated performance and adjusted for use of new project control practices.
- Reports should be prepared on project-by-project basis and program-wide results.
- Target performance cannot be protected from external market forces now shaking up the national and global construction environments.

Action Plan:

- Identify and track key measures of external market conditions (i.e., steel, fuel, equipment, and real estate).
- Update construction estimates as market conditions dictate and report in the *Gray Notebook* and to OFM.
- Continue quarterly project review process at WSDOT.
- Continue to use and refine Cost Estimating Validation Process techniques to identify and manage project cost and schedule risks.
- Expand use of Advance Right of Way purchase program.
- Increase use of Value Engineering and constructability reviews to bring down construction costs.
- Implement lessons learned from review of previous biennium's delivery record.

Highway Project Delivery

Schedule: What will milestone reports look like for the 2005-07 Nickel Program?

2003-05 Nickel Project Results for 108 Projects

Milestone	# projects active for this phase	On-Time		Late	
		#	%	#	%
Project Definition	25	25	100%	0	-
Begin Engineering Phase	55	51	93%	4	7%
Environmental Assessment Complete	23	20	87%	3	13%
Right of Way Certification	13	10	77%	3	23%
Advertise Project	39	34	87%	5	13%
Operationally Complete	13	12	92%	1	8%

Analysis

- Milestones are indicators of progress in the project delivery cycle but are not measurements of delivery effectiveness.
- A slipped milestone may not affect the date the project is operationally complete, other milestones, project schedule, and/or cost.

Action Plan

- Project management focuses on preventing and/or mitigating milestone slippages before they occur.

Data Notes: Baseline budget is the 2004 Supplemental Budget and includes Nickel funds only. Some Nickel Projects have both Nickel and PEF funding sources. PEF baseline data for Nickel projects is currently being researched and will be included in the next *Gray Notebook* (GNB) report, available on November 28, 2005. *Advertise Project* and *Operationally Complete* are on-time if completed within the scheduled baseline calendar quarter (consistent with the GNB). All other milestones are reported as on time if they are completed within +/- 6 weeks of baseline date. *For milestone definitions, see back-up slide.*

Schedule: Which delivery milestones will be tracked for 05-07?

Schedule Tracking Milestones by Funding Source

Milestone	PEF	Nickel	TPA
Project Definition		X	X
Begin Engineering Phase	X	X	X
Environmental Assessment Complete		X	X
Right of Way Certification		X	X
Advertise Projects	X	X	X
Operationally Complete	X	X	X

82 of the 110 Nickel highway construction projects will be underway or completed by the end of 2005-07 in accordance with the Legislative list.

Analysis

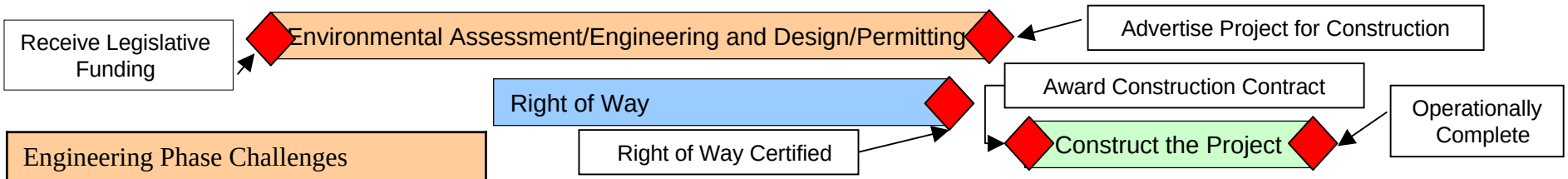
- Baseline data for the 6 milestones is available for Nickel funded projects.
- TPA Project baseline data must be recalibrated due to funding delays caused by I-912.
- Milestones for PEF projects are currently being researched and analyzed. Programmatic information has been reported in the *Gray Notebook* (GNB).

Action Plan

- WSDOT will report on these 6 milestones quarterly in the GNB in an easy to review, summary fashion.
- Baseline data enhancements will be made for Nickel and TPA projects to reflect all project dollars.
- Pending completion of milestone definition, PEF project milestones reporting will begin with the December 2005 edition of the GNB (to be published in February 2006).

Highway Project Delivery

Risks: What are general key challenges to project delivery?



Engineering Phase Challenges

Funding disruptions and legislative re-prioritization

Project cost increases from original budget due to external market influences on price of materials

Delays and/or cost increases as a result of environmental assessment, approval and permitting

Legal challenges to environmental assessment or permits

Changes in environmental requirements

Disputes over the information needs of permitting agencies

Resolving project design elements with local communities, citizens and federal partners

Limitations on subsurface investigations

Preliminary survey errors

Availability and error risk of in-house staff resources and outside consultants

Right of Way Phase Challenges

Increased costs due to zoning changes, funding delays, condemnations; and property value inflation

Hold-out property owners

Slow utility coordination

Coordination between design engineers and right of way plan development

Construction Phase Challenges

Third party interference with contactor progress

Incorrect contractor work or material

Weather

Unanticipated conditions (site, utilities, third party impacts)

Quantity variations

Delays in utility relocation

Mistakes in WSDOT's plans or designs

Data notes : Individual risks are organized by the level of influence and the amount of control WSDOT has to avoid or prevent the risk. Listed from low to high level of influence within each category.

Highway Project Delivery

Risks: What are the pre-construction delays for 10 projects reviewed by JLARC for TPAB?

Activities Where Delays Occurred

Pre-construction Activity	Number of Projects with Delay in This Activity
Planning	2
Design	0
Environmental Documentation	1
Environmental Permitting	5
Right of Way Acquisition	1
Legal challenges to permits or Right of Way decisions	2
Funding Delays or Interruptions	9

Causes for Delays in Environmental Activities

Federal permitting staffing sabbatical	1
Lack of coordination between permitting agencies	2
Changes in Federal Environmental Rules, Regulations Guidance, and Policy	4

Analysis

- All 10 projects attempted to take advantage of environmental streamlining practices.
- In 9 of 10 projects, funding interruptions affected pre-construction delivery tasks including environmental.

Actions

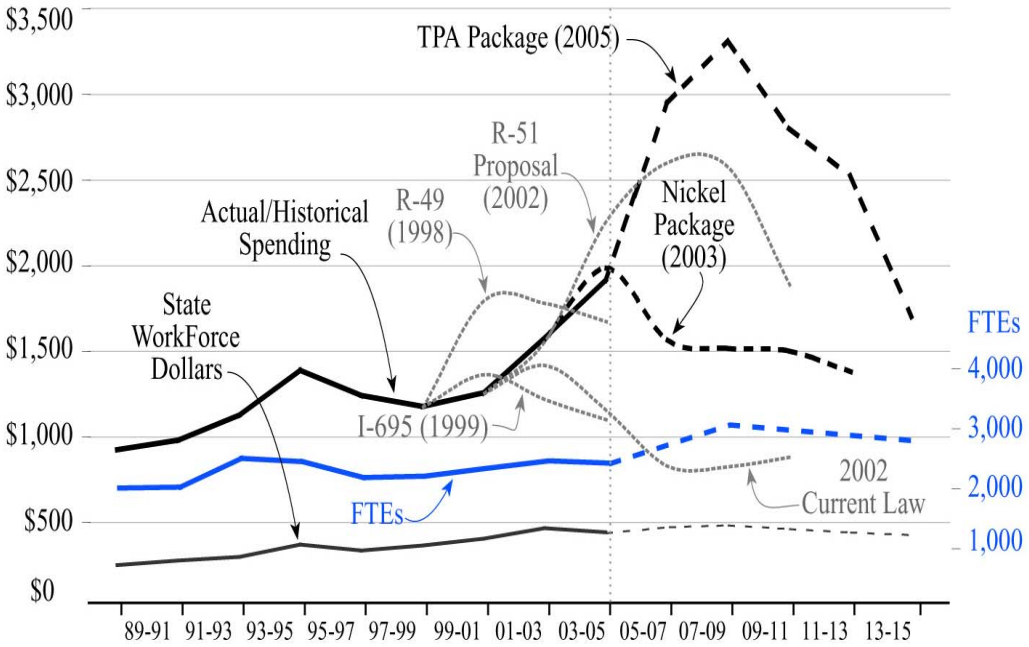
- Implement JLARC'S recommendations on coordinating and tracking schedules, further developing and using on-line permit applications, and using streamlining practices.
- Pursue the following regulatory improvements:
  - *Resolve Talent decision regulatory problem with Army Corps of Engineers*
  - *Participate in crafting Washington's input on Endangered Species Act implementation to improve workability and effectiveness*
  - *Continue to implement the successful Multi-Agency Permit Team model*
  - *Expand the use of unconventional mitigation approaches*

Workforce: How does fluctuating transportation funding impact workforce management?

Highway Capital Program Trends

Actual and Projected Dollars and FTEs for 1987-2015

Dollars in Millions



Analysis

- Fluctuations in revenue streams (initiatives, referendums) have impacted WSDOT's ability to staff and deliver projects efficiently, requiring varying approaches to mitigate impacts.

Mitigation Strategies

- Permanent staff are supplemented by temps and or overtime to accommodate seasonal delivery needs.
- Consultants are used to manage workload spikes; to deliver workloads over and above available core workforce and to provide special expertise.
- *Design-Build* authority and authority for use of consultants in contract administration have provided new tools for capital delivery.
- *Personnel System Reform Act* changed the contracting out requirements and created more flexibility in the merit system rules to utilize workforce resources.

Data Notes: Full size graph in back up slides.

Workforce: What is the most effective balance between in-house and outsourced project delivery staffing?

Analysis

- Maintaining the *core competency* of state workforce preserves the institutional knowledge, engineering capabilities and management skills. This is an ongoing balancing act.
- Nationally, states report in-house engineering design staff less costly than consultants.
- The driver for consultant use is the necessity to supplement staff in times of workload peaks, as well as needed specialized expertise and skills.
- Cross-fertilization of consultant and WSDOT staff has led to a strong and collaborative transportation design culture in Washington state.
- National experience teaches us that "strong owner" role of project management and engineering oversight is essential to successful and accountable project delivery.

Action Plan.

- Continue to size the capital delivery workforce to maintain core competency of skills needed.
- Continue strong working relationship with consultant and contractor community to maximize effective delivery models and tools (i.e. design-build, blended design teams and contractor innovations).
- Develop a recruitment and retention plan to address the impending challenges of a diminishing engineering workforce (over 35% of WSDOT's managers are eligible to retire within the next five years).
- Continue senior leadership development program to assure succession planning and availability of well trained and capable leaders

What is *Core Competency*?

- Maintain and enhance intellectual capital and institutional knowledge
- Keep current with new technology and best practices nationally and internationally
- Maintain experience to plan, design and manage complex and critical projects
- Quality control and oversee consultants and contractors work products

Back-Up Slides Index

Back-Up Slide	Title	Correlates With Main Slide Number
2	DOT 2005-2007 Highway Construction Budget by Program and Funding Source	3
3	Current Highway Project Definition Matrix	4
4	93 Projects Over Budget Graph	9
5	Schedule Milestone Definitions	12
6	Pre-Construction Project Delivery Risks for Ten Projects	15
7	Highway Capital Program Trends Graph	16